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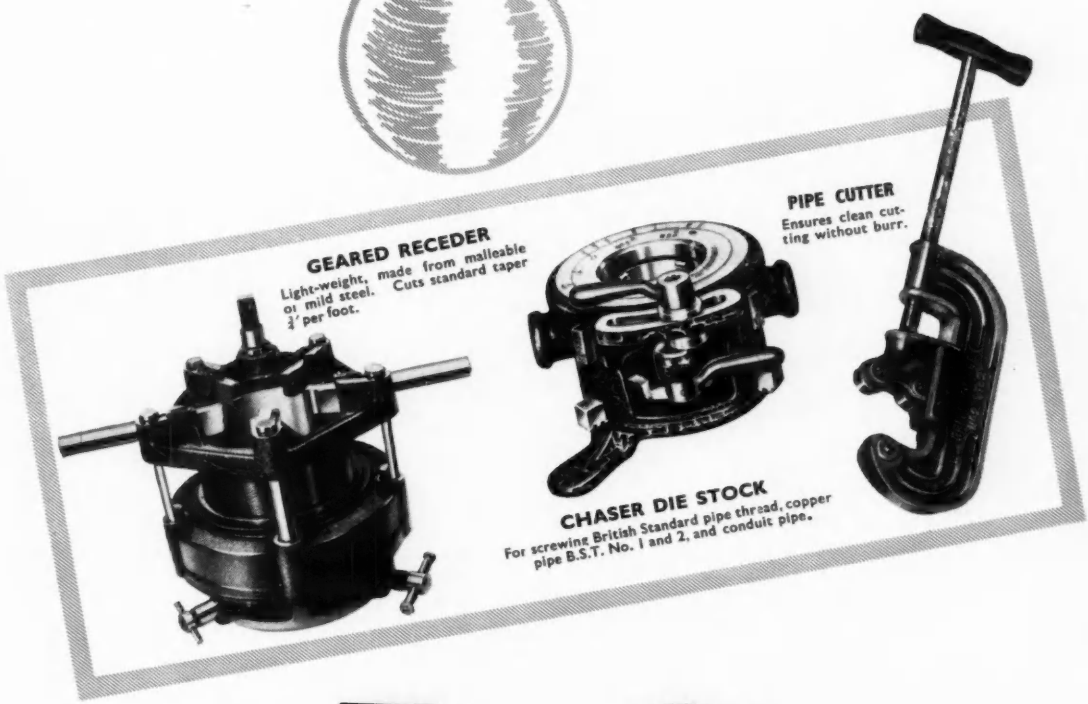
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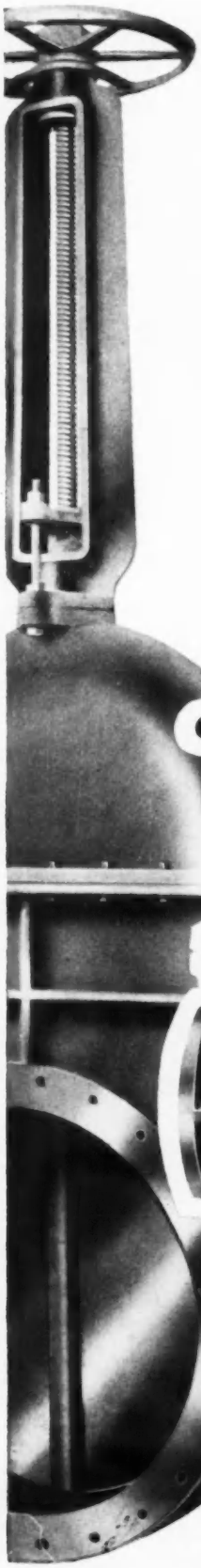

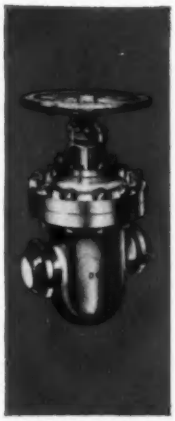

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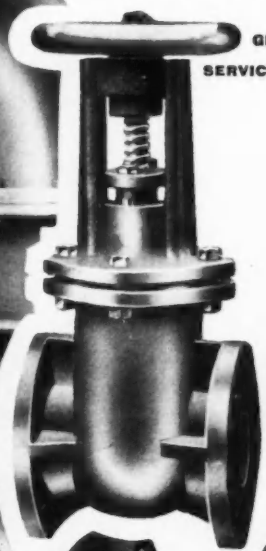

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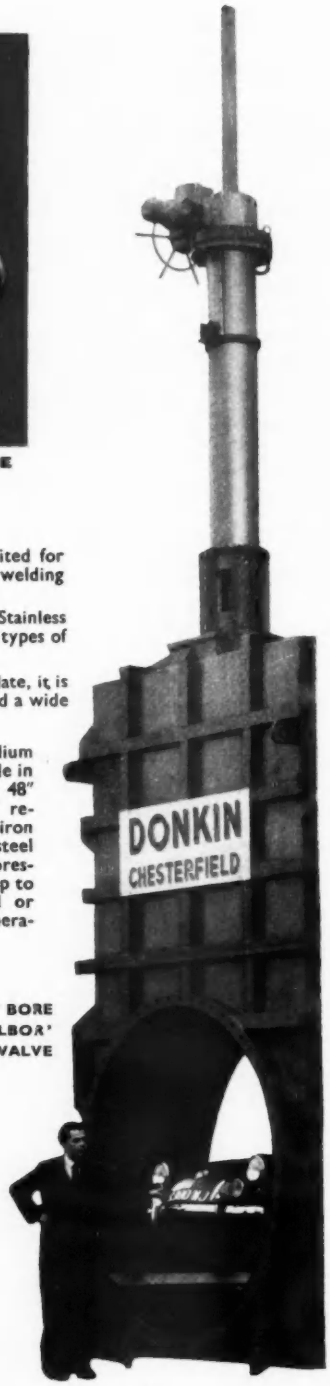

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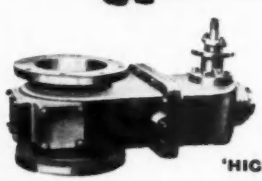

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Gas Journal

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Past progress, future aims

IT would be invidious to suggest that the Chairman's address of any one District Section of the Institution should carry any greater weight than that to any other, but it is possible that the Chairman of the London and Southern Section may be in a better position than most to compare the best of the past with the most progressive processes and techniques of the present and with possible developments of the foreseeable future.

This is not to belittle individual achievements in other parts of the country over the past half century or so, but we feel that it is fair to say that in prenationalisation days when improvements in gas production were beginning to be exploited, it was only the bigger undertakings which could really afford the expenditure on the more unorthodox plants of those days, or on the research work necessary to develop new uses for gas and new appliances in which to consume it.

The boards included in the London and Southern Section may therefore be said to have a tradition of progress and a will to experiment which may well have been denied some other boards in the past, through no fault of their own but merely because no one of their undertakings had operated in a big enough way before nationalisation.

In his recent address to the London and Southern Section, the Chairman, Mr. J. A. Hepworth, Chief Engineer of the North Thames Board, is at pains to stress the need for a proper perspective of the progress being made by the industry today and to relate it to that achieved between the periods 1919 and 1939, and 1939 and 1959 respectively. Both these periods of 20 years were influenced by the effect of a world war on social conditions and industrial progress, but this would be true for other fuel industries as well as our own.

Clearly one of the most important steps forward taken by the gas industry after the first world war was the decision to change the basis for the sale of gas from an illuminating standard to a heating standard.

From the moment this was officially realised gas could forge ahead in its own right as a fuel industry. The therm had been born and was entering the lists against an increasingly formidable opponent, the kilowatt hour. Gas engineers in the early 1920's had at last got a unit of heat which they could evaluate to some standard of production performance and stipulate a basic value for costing. In other words the battle for the cheaper therm was on, and it still continues with undiminished intensity. Chasing the therm in the retort houses was, Mr. Hepworth reminds us, the primary occupation of those days. Gas production began to make rapid strides, and the vertical retort began to replace the old horizontals.

In the latter half of this period, coke ovens were used successfully at Beckton for the large-scale production of coal gas. Clearly the real importance of the new carbonising methods was the greater facilities they offered for mechanical handling. The old horizontal retort, and the inclined retort which had a certain vogue up till the 1920's could be mechanised, and the stoking machines of the period did their work reasonably well, but the increased size of plants becoming necessary demanded a simpler and less restricted field in which to develop. As plants grew, so did the possibility of cutting labour costs with efficient, reliable mechanical handling.

The quality and purity of gas improved. Better purification systems, including the installation of dry-gas plants and benzole extraction, helped to provide a better service to the customer and possibly a more consistent gas, though the very great importance of this particular quality does not seem to have made itself felt until very much later.

It may fairly be said, then, that during this period of great change, the production side of our industry, certainly as we knew it up to a few years ago, was born.

The second period of 20 years began with the outbreak of the second world war and serious damage to a number of production plants. The stagnation in any form of effective progress in gasmaking methods, the development of ancillary processes and the extension of mechanical handling, prevented any further effective reduction in costs being feasible. Gas was, however, still competitive at the end of the war, but it was unlikely to remain so for very long.

Nationalisation was the great step forward taken at this period in that it forced integration into the size of units we now regard as the minimum for an industrial enterprise. The industry no longer needed to be parochial, gas supply areas were expanded to the confines of the area boards and there was no longer any

necessity for progress in the installation of new and up-to-date plant to be restricted; even the small village undertakings could be connected to the fast developing grid systems. Bigger production plants promised to cut the cost of production, utilising the by then (1949) well established gas-making processes.

It, is of course, the last ten years of this period that has seen the introduction of the new gas production processes which would have seemed impossible and certainly unnecessary to the leaders of our industry in the early 1920's. Did we not have the best coal in the world? Superb qualities of gas and coking coals are still to be found in the North of England, but their quantity would seem to be diminishing and their price—and the cost of freight is increasing. On this point, Mr. Hepworth quotes some interesting figures for coal prices paid by the North Thames Board and its predecessor, the Gas Light and Coke Company, over the last 40 years. In 1919, coal delivered to the London gasworks cost 38s. 9d. a ton, in 1939 this had dropped to 24s. 1d., but in 1959 it had risen some fivefold to 124s. 6d.

Wages, too, when the labour was available, had risen. In 1919 the standard wage rate for the ordinary gasworks labourer stood at £2 19s.; this had dropped to £2 18s. 3d. by 1939, but by 1959 it had risen more than threefold to £9 17s. 9d.

The next 20 years

What of the next 20 years? What developments can we expect to see by 1979? Clearly the most important factors influencing gas production since the war are mainly social, which have had the effect of raising the standards not only of the life of the lower paid worker, but of the kind of job open to him. The shortage of house help in all classes of the population has discouraged the use of solid fuel with all its attendant dust and hard work.

The effect of these tendencies has been to mechanise every industry, including our own, to an ever increasing extent, and reduce the demand for coke, the income from the sale of which has in the past been a means of reducing the net price of gas to the consumer. Gasworks in the South of England, Mr. Hepworth stresses, will therefore have to grapple with the problems of expensive coal, high freights, and the fall in demand of ordinary grades of coke. Here then the field is open for the gasification of oil and oil products, the reforming of refinery gases, and ultimately perhaps the processing of imported methane, either as liquid by tanker, or gaseous by submarine pipeline from the Continent.

Clearly those boards situated in the coalfields will be able to gain advantages from short hauls from the collieries to their existing gasworks, and if the pattern of coke demand in certain areas remains as it is during the next few years, drastic changes in gas-making policy might not be so vital. However, the idea of a national gas grid has by now been accepted in principle at least, and this in itself is likely to influence the forward thinking of those who find themselves in the dilemma of having to make gas competitive with refined fuels and to placate those clamouring to maintain the place of coal in the country's economy. The building of complete gasification plants at, or within belt-conveyor distance of, collieries mining a suitable coal, would not only cut out freight charges but would obviate the need for costly carbonising coals.

Since such plants are capable of very high gas-making outputs, the very large volumes of gas they make available could be transported by pipeline over comparatively long distances.

This conception as applied in practical form to England was first put forward by Dr. J. Burns in his Presidential Address to the Institution a few years ago, and would almost certainly involve an over-riding gas production authority supplying the individual networks of the area boards.

Three problems solved

Such new conceptions would, Mr. Hepworth thinks, solve three important problems facing the industry. The first we have already referred to, the high freight charges to the South of England—4d. a therm on all gas made in the North Thames Board's area; the second is that the presence of the traditional gasworks in a built-up area is becoming increasingly objectionable; and thirdly, the increasing difficulty of finding labour for the very arduous, dirty and hot jobs connected with gas from carbonisation. A visit to the newly commissioned Lurgi plant at Westfield in Scotland confirms that the excellent working conditions claimed for this type of plant are fully borne out in practice.

It is clear, however, that any startling change in gas-making plant in actual commercial production is unlikely, since much of the existing conventional carbonising plant is relatively new and is capable of many years of useful production.

As new raw materials become available for gasmaking, the question of gas quality assumes increasing importance, and much has been done since nationalisation to distribute cleaner gas of more constant combustion characteristics. This is particularly important where gas from several sources is being distributed in the same district. Mr. Hepworth points out, for instance, that the organic sulphur content of reformed refinery gas from the Romford works is about .5 grains per 100 cu.ft., whereas the average in the North Thames Board's area is now rather less than 10 grains. He also states that the freedom from corrosion of appliances in the immediate neighbourhood of Romford is most noticeable.

Clearly the industry's aim in the next ten years must be to produce a gas of 'perfect' quality in full competition with other refined fuels. By 'perfect' we mean a gas of a quality at least as good as l.p.g. It does seem that the industry will need to have even closer relations with the oil industry, and to work in complete harmony with it by gasifying or suitably modifying any oil product in surplus production. In addition, the complete gasification of coal must be carried out in the coalfield itself, the gas being enriched by suitable high calorific gases, either imported as such or obtained from the oil refinery.

Clearly this is an ideal which may well be achieved by the end of the third 20-year period, and we hope that any success in grappling with present-day problems in the industry will command the admiration of our successors when they in turn look back on the '50's. and '60's.

From a paper read to the South Western Section of the I.G.E.

Supervision, telemetering and control of unattended gasholder stations over the public telephone system

By C. R. P. STONOR,
MANAGING DIRECTOR,
SOUND DIFFUSION (AUTO-THERMATIC) LTD.

WHAT is the object of installing a supervisory system at a holder station? First, to give a better consumer service and secondly, to reduce distribution costs. The object is not to fill control rooms with impressive cubicles of instruments and dials, neither is it to have on hand gratuitous information which cannot possibly promote any action on the part of the control room attendant. As a general principle only the minimum information should be transmitted to the control room necessary for effective action to be taken at all times or useful assessments to be made of area conditions.

This principle not only applies to the class of information but also to the accuracy with which it is presented. If the installation of a simple supervisory system costing, say, £1,000, eliminates a man shift, a handsome 'pay-off' has been achieved. If the installation of a more elaborate and accurate system, costing say £2,000, does not achieve further savings in man power, the extra money has been wasted. It is often argued that there will be a further improvement in consumer service by virtue of a more comprehensive system being installed, but such improvements, if they exist, are so marginal that they can be discounted.

Annual revenue charges

Having simplified the requirements asked of the supervisory system in order to keep capital costs to a minimum, annual revenue charges associated with the operation of the system must be reduced to a minimum.

Revenue charges can look innocuous, but when capitalised on a 10% basis, £50 per annum becomes equivalent to a capital expenditure of £500. The annual maintenance commitment must also therefore be reduced to a minimum. This can be achieved by first class design and the standardisation of units which should be built as plug-in elements so that unskilled replacement maintenance in the field will suffice.

Periodic routine inspections provided by the manufacturers of supervisory equipment are relatively expensive, and again the design of the equipment should be such as to make them unnecessary. Self supervision of many of the functions can achieve this, and an early warning of pending failure can be included in the supervisory message. More faults may well be caused by routine inspections than are prevented by them.

The one revenue charge which usually outweighs all others is that arising from the privately rented Post Office line used to connect the outstation with the control room. If a cheaper transmission medium is available, the supervisory system should be capable of operating through it.

To summarise:

1. A careful analysis of the basic information required by the control room should be made in order to reduce the complexity of the supervisory equipment, thus improving the capital cost factor.
2. The amount and accuracy of the information transmitted should be the minimum to secure effective action by the control room attendant.
3. The annual revenue commitment of a supervisory system should be carefully assessed in relation to its grossed up capital value and every effort made to minimise it.
4. Low maintenance costs can be achieved by standardisation of plug-in units and the elimination of periodic inspections.
5. The cheapest transmission medium should be employed.

There are three Datofonic systems classified as Mark I, Mark II and Mark III. The Mark I system provides the supervisory information in a series of verbal statements. The Mark II system provides information on telemetered dials and indicator lamps. In addition, remote control facilities are available. The Mark III system is a combination of the Mark I and Mark II system, and provides its information in a verbal form, and remote control facilities are available. All three systems operate over the public telephone system, over private lines, or over radio links. For the purpose of the ensuing discussion they are considered only in reference to their operation on the public telephone system.

Interrogation of system

The Mark I system can be interrogated by ringing into it from any telephone on the public system, but it will also dial the number of the central control room if an out of limit condition arises on the pressures or stocks which are being supervised at the unattended holder station,

First, let us consider an interrogation by the control room attendant. He would make a telephone call to the holder station's number in the normal manner and after a short period of ringing the Datofonic equipment closes the Post Office line and announces itself by name and number. Having repeated the identification several times the equipment would release a series of statements corresponding to pressure and stocks which would be heard and

noted by the control room attendant. At the end of the message the control room telephone handset would be replaced and the Datofonic equipment on the holder site would reset itself and open the Post Office line.

If, on the other hand, an out of limit condition occurred at any time, the Datofonic equipment would immediately close the Post Office line and dial the number of the control room telephone. If the holder station's telephone was connected to a manual exchange, the equipment would make a series of requests in verbal form for connection to the control room number.

At the end of the dialling sequence the holder station equipment would announce its identity so that the control room engineer would know from where the call had originated. Then would follow the verbal statements which describe the stocks and pressures including, of course, the out of limit condition which caused the call to be made.

After the supervisory message is completed the equipment invites the control engineer to 'Send acknowledgment signal now.' The acknowledgment signal consists of a three-second duration audio tone generated by a small transistor oscillator attached to the control engineer's telephone. Operated from a press button, this unit produces the correct length of tone pulse irrespective of the time that the button is depressed.

Total of four calls

Unless the equipment receives the acknowledgment signal it would re-dial the control room after a period of approximately three minutes. If no acknowledgment signals are received the equipment will make a total of four calls before abandoning its efforts to obtain the control room number. It will be appreciated that when an acknowledgment signal is received the equipment closes down and does not make further repeat calls.

After the invitation to acknowledge has been given the equipment invites the control engineer to 'Send repeat message signal now.' If the three-second tone signal is transmitted then, the equipment will retain the Post Office line and repeat the entire message. A mobile engineer in a public call box can signal the repeat message signal by whistling into the mouthpiece for a three-second period. The frequency of his whistle is not important, and providing the time is between two and four seconds the Datofonic equipment will accept the signal and repeat the message.

For the operation of a Mark II system the control room is provided with a small console carrying up to seven telemeter dials and a number of indication lamps.

When the attendant wishes to interrogate the holder station equipped with a Mark II system, he would make a telephone call in the normal manner. The Mark II equipment would answer the call and give the usual preamble concerning name and number. Immediately following the preamble the control room attendant would press a supervisory request button on his console causing the holder station equipment to transmit a high speed coded audio signal.

This signal selects and rotates the pointers of the various telemeter dials to the correct amounts relative to the quantities which they are measuring. The indicator lights will also display the correct information relative to the distant pieces of plant to which they refer.

At the end of the supervisory signal train the control room attendant can effect remote control over the distant volumetric governor or boosters.

The Mark III system operates in an indentical manner to the Mark I system as regards the verbal supervisory message but at the end of the message the equipment issues an invitation to the control engineer to 'Send control signals now.' The attendant would then select and transmit the necessary instruction to the volumetric governor or booster by means of a desk top transmitter unit.

It will be seen that the Mark I and Mark III systems are able to pass their information to any telephone on the public system but the Mark II system can only be interrogated from the control room as it requires the display console on which to provide its visual information.

To illustrate how the Mark I verbal system selects the correct statement for transmission relative to the quantity which is being supervised—a district pressure between 2-in. and 10-in. w.g. has been taken as an illustration—a recording would be made with nine statements on it comprising; district 2, district 3, district 4, etc. If a lightweight pickup is allowed to play over this recording and by electrical means those statements which do not correspond to the actual district pressure are suppressed, the distant control room attendant will only hear one announcement which will give him the correct information regarding the pressure.

The pickup has played, in fact, over all the statements but only the correct statement is allowed out onto the telephone line. It is not necessary to lift the pickup arm off the record or in any way to secure indexing of the pickup relative to a particular groove in the record.

The suppression and release of the various statements is achieved as follows: The primary information relative to the district pressure is produced by a small manometer which has nine contacts in the mercury. According to the height of the mercury a certain number of contacts will have voltage applied to them.

When the record is made a short synchronising pulse is recorded at the end of each spoken statement. When the record is playing this synchronising pulse causes a telephone type rotary stepping switch to move one contact at the end of each statement. The contacts of this switch are connected sequentially to the mercury contacts of the manometer. When the rotary stepping switch meets the first of the manometer contacts in the mercury a relay is operated, the contacts of which switch the output from the pickup on the record to the telephone line. Thus the distant listener will hear the statement which corresponds to the pressure.

Double the accuracy

With nine statements covering a range from 2 in. to 10 in. w.g., the maximum accuracy available would be $\pm\frac{1}{2}$ in. w.g. Circuit arrangements in the Datofonic equipment provide double this accuracy to be given without using further announcements.

This is achieved by releasing two announcements if the actual pressure lies between, say, 5 in. and 6 in. w.g. The manometers are adjusted so that if the pressure lies between 4.75 in. and 5.25 in. a single statement of 5 in. is released. If, however, the pressure lies between 5.25 in. and 5.75 in. two announcements would be released, namely, 6 and 5. The control room attendant would then know to take the pressure as being 5.5 in. and the maximum error would then be $\pm\frac{1}{4}$ in. w.g. This dual announcement arrangement for indicating mean values doubles the effective range of available statements on the Datofonic equipment.

The normal range of accuracy is: Stock at $\pm 2\frac{1}{2}\%$ of maximum; district $\pm\frac{1}{4}$ in. w.g. over the important range; grid $\pm\frac{1}{2}$ p.s.i. up to 10 p.s.i. and then $\pm 1\frac{1}{2}$ p.s.i. up to 30 p.s.i.; flow $\pm 5\%$ between 20% and 100%.

For monitoring booster operation three statements are provided; booster is running, booster is not running, and

booster failure. The booster failure signal is released when the contactor to the booster has closed but the pressure on the output of the booster has not risen after a period of 15 seconds following the closure of the contactor. The pressure is sensed by a pressure switch in the output of the booster. Since a booster failure condition constitutes an alarm the Datofonic equipment would immediately originate a call to the control room in order to report the malfunction of the booster. Electricity supply failure and anti-freeze failure are monitored and reported in a similar manner.

The average length of the supervisory message is approximately two minutes but in some instances the message is split into two sections. The first section is used to monitor the expected range of stocks and pressures thus cutting down the period of listening by the control room. Under alarm conditions the equipment will instruct the control room to listen to the second section of the message which contains the unexpected range of measurements and such statements as booster or electricity failure. In this way, the normal interrogation period can be reduced to under a minute.

Power alternatives

Mark I equipment at the holder station can be powered either from a dry battery unit, a mains driven unit with standby dry batteries, or with a nickel alkaline battery charged from the mains. The dry battery unit will give approximately 300 messages before requiring replacement.

An automatic monitor arrangement is incorporated with the equipment so that when the battery voltage drops below a certain level a message is released during the supervisory message indicating that the battery voltage is low and that it should be reported to the maintenance service. The actual choice of the power supply is decided by the estimated amount of traffic which the system will carry.

The Mark I system has full Post Office approval for connection to their subscriber lines. They will not, however, permit the system to originate an automatic call which requires the intervention of more than one manual operator. It is in order for the system to dial O and request the number but if the operator has to pass the request to a second manual operator the Post Office will not allow the use of the Mark I system.

There is no objection to the equipment being interrogated from any telephone on the national network, and in cases where two operators are required to complete the call to the control room we arrange for the equipment to call a local number which would then pass the information on to the control room. This difficulty is not very often met and in any case, with the rapid increase of the number of automatic exchanges it will pass altogether during the foreseeable future. It is worth mentioning that the calling facilities of the Mark I equipment can be modified to call two different numbers alternately.

The Mark II system provides the control room attendant with the supervisory information set up on telemeter dials and indicator lamps. The interrogation or alarm call are carried out in an identical manner with that of the Mark I system, but after the initial preamble of the verbal message the control engineer can depress a supervisory request button which causes the equipment on the holder station site to transmit a voice frequency tone signal. This signal is interpreted by the decoding equipment in the control room and displayed on the console dials and lamps.

The standard Mark II system will provide up to seven telemetered channels and 12 lamp indications, but these numbers can be exceeded at small extra cost.

An accuracy of up to $\pm 1\frac{1}{4}\%$ is available on each telemeter channel, but in accordance with our principle of economy we would not advise the full accuracy to be used unless really necessary as it increases the cost of the primary sensing instruments.

The average time for the complete display to be set up on the console is less than 20 seconds, and in some cases this may be considered an advantage over the more leisurely rate of the supervisory message of the Datofonic Mark I system. An obvious drawback, however, is that the information can only be received by the control room attendant as it is necessary to have the display and decoding equipment available. This rules out the interrogation from a call office box which the mobile engineer is able to make when the holder station is equipped with a Mark I system.

The display console in the control room can be used with an indefinite number of holder stations. This is achieved by providing detachable engraved plaques for dropping on to the face of the display panel, each plaque being marked according to the associated holder station which it represents.

Remote control facilities are available on the Mark II system and are transmitted by means of a telephone type dial. For instance, the dial code of 022 would close down the volumetric governor. Dial code 033 would open it by an $\frac{1}{3}$th and progressive dial codes would increase the setting of the governor in $\frac{1}{3}$th steps up to maximum.

The control of boosters or other plant is carried out in a similar manner by dialling the associated code. The decoding circuits have been carefully designed to reject false signals which may be picked up by the telephone lines during the remote control signalling period.

Drop-on plaques

The system of individual drop-on plaques to provide the correct display for each individual holder station can be extended to give individual mimic diagram displays of each station. This is achieved by storing the information which is gathered on the main console and transferring it to the individual diagrams associated with the holder stations which are being interrogated. It is then permanently stored until a further block of information is fed to the diagram.

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The Mark III system is basically the verbal Mark I system, plus the remote control facilities of the Mark II system.

For interrogation and alarm calls the system operates as a Mark I equipment, but at the end of the supervisory message the record invites the control room attendant to 'send control message now.' The control room is equipped with a small desk top cabinet upon which is mounted a telephone type dial for sending instruction codes to the distant Datofonic equipment. As with the Mark II system these codes will select various positions

noted by the control room attendant. At the end of the message the control room telephone handset would be replaced and the Datofonic equipment on the holder site would reset itself and open the Post Office line.

If, on the other hand, an out of limit condition occurred at any time, the Datofonic equipment would immediately close the Post Office line and dial the number of the control room telephone. If the holder station's telephone was connected to a manual exchange, the equipment would make a series of requests in verbal form for connection to the control room number.

At the end of the dialling sequence the holder station equipment would announce its identity so that the control room engineer would know from where the call had originated. Then would follow the verbal statements which describe the stocks and pressures including, of course, the out of limit condition which caused the call to be made.

After the supervisory message is completed the equipment invites the control engineer to 'Send acknowledgment signal now.' The acknowledgment signal consists of a three-second duration audio tone generated by a small transistor oscillator attached to the control engineer's telephone. Operated from a press button, this unit produces the correct length of tone pulse irrespective of the time that the button is depressed.

Total of four calls

Unless the equipment receives the acknowledgment signal it would re-dial the control room after a period of approximately three minutes. If no acknowledgment signals are received the equipment will make a total of four calls before abandoning its efforts to obtain the control room number. It will be appreciated that when an acknowledgment signal is received the equipment closes down and does not make further repeat calls.

After the invitation to acknowledge has been given the equipment invites the control engineer to 'Send repeat message signal now.' If the three-second tone signal is transmitted then, the equipment will retain the Post Office line and repeat the entire message. A mobile engineer in a public call box can signal the repeat message signal by whistling into the mouthpiece for a three-second period. The frequency of his whistle is not important, and providing the time is between two and four seconds the Datofonic equipment will accept the signal and repeat the message.

For the operation of a Mark II system the control room is provided with a small console carrying up to seven telemeter dials and a number of indication lamps.

When the attendant wishes to interrogate the holder station equipped with a Mark II system, he would make a telephone call in the normal manner. The Mark II equipment would answer the call and give the usual preamble concerning name and number. Immediately following the preamble the control room attendant would press a supervisory request button on his console causing the holder station equipment to transmit a high speed coded audio signal.

This signal selects and rotates the pointers of the various telemeter dials to the correct amounts relative to the quantities which they are measuring. The indicator lights will also display the correct information relative to the distant pieces of plant to which they refer.

At the end of the supervisory signal train the control room attendant can effect remote control over the distant volumetric governor or boosters.

The Mark III system operates in an indentical manner to the Mark I system as regards the verbal supervisory message but at the end of the message the equipment issues an invitation to the control engineer to 'Send control signals now.' The attendant would then select and transmit the necessary instruction to the volumetric governor or booster by means of a desk top transmitter unit.

It will be seen that the Mark I and Mark III systems are able to pass their information to any telephone on the public system but the Mark II system can only be interrogated from the control room as it requires the display console on which to provide its visual information.

To illustrate how the Mark I verbal system selects the correct statement for transmission relative to the quantity which is being supervised—a district pressure between 2-in. and 10-in. w.g. has been taken as an illustration—a recording would be made with nine statements on it comprising; district 2, district 3, district 4, etc. If a lightweight pickup is allowed to play over this recording and by electrical means those statements which do not correspond to the actual district pressure are suppressed, the distant control room attendant will only hear one announcement which will give him the correct information regarding the pressure.

The pickup has played, in fact, over all the statements but only the correct statement is allowed out onto the telephone line. It is not necessary to lift the pickup arm off the record or in any way to secure indexing of the pickup relative to a particular groove in the record.

The suppression and release of the various statements is achieved as follows: The primary information relative to the district pressure is produced by a small manometer which has nine contacts in the mercury. According to the height of the mercury a certain number of contacts will have voltage applied to them.

When the record is made a short synchronising pulse is recorded at the end of each spoken statement. When the record is playing this synchronising pulse causes a telephone type rotary stepping switch to move one contact at the end of each statement. The contacts of this switch are connected sequentially to the mercury contacts of the manometer. When the rotary stepping switch meets the first of the manometer contacts in the mercury a relay is operated, the contacts of which switch the output from the pickup on the record to the telephone line. Thus the distant listener will hear the statement which corresponds to the pressure.

Double the accuracy

With nine statements covering a range from 2 in. to 10 in. w.g., the maximum accuracy available would be $\pm\frac{1}{2}$ in. w.g. Circuit arrangements in the Datofonic equipment provide double this accuracy to be given without using further announcements.

This is achieved by releasing two announcements if the actual pressure lies between, say, 5 in. and 6 in. w.g. The manometers are adjusted so that if the pressure lies between 4.75 in. and 5.25 in. a single statement of 5 in. is released. If, however, the pressure lies between 5.25 in. and 5.75 in. two announcements would be released, namely, 6 and 5. The control room attendant would then know to take the pressure as being 5.5 in. and the maximum error would then be $\pm\frac{1}{4}$ in. w.g. This dual announcement arrangement for indicating mean values doubles the effective range of available statements on the Datofonic equipment.

The normal range of accuracy is: Stock at $\pm 2\frac{1}{2}\%$ of maximum; district $\pm\frac{1}{4}$ in. w.g. over the important range; grid $\pm\frac{1}{2}$ p.s.i. up to 10 p.s.i. and then $\pm 1\frac{1}{4}$ p.s.i. up to 30 p.s.i.; flow $\pm 5\%$ between 20% and 100%.

For monitoring booster operation three statements are provided; booster is running, booster is not running, and

booster failure. The booster failure signal is released when the contactor to the booster has closed but the pressure on the output of the booster has not risen after a period of 15 seconds following the closure of the contactor. The pressure is sensed by a pressure switch in the output of the booster. Since a booster failure condition constitutes an alarm the Datofonic equipment would immediately originate a call to the control room in order to report the malfunction of the booster. Electricity supply failure and anti-freeze failure are monitored and reported in a similar manner.

The average length of the supervisory message is approximately two minutes but in some instances the message is split into two sections. The first section is used to monitor the expected range of stocks and pressures thus cutting down the period of listening by the control room. Under alarm conditions the equipment will instruct the control room to listen to the second section of the message which contains the unexpected range of measurements and such statements as booster or electricity failure. In this way, the normal interrogation period can be reduced to under a minute.

Power alternatives

Mark I equipment at the holder station can be powered either from a dry battery unit, a mains driven unit with standby dry batteries, or with a nickel alkaline battery charged from the mains. The dry battery unit will give approximately 300 messages before requiring replacement.

An automatic monitor arrangement is incorporated with the equipment so that when the battery voltage drops below a certain level a message is released during the supervisory message indicating that the battery voltage is low and that it should be reported to the maintenance service. The actual choice of the power supply is decided by the estimated amount of traffic which the system will carry.

The Mark I system has full Post Office approval for connection to their subscriber lines. They will not, however, permit the system to originate an automatic call which requires the intervention of more than one manual operator. It is in order for the system to dial O and request the number but if the operator has to pass the request to a second manual operator the Post Office will not allow the use of the Mark I system.

There is no objection to the equipment being interrogated from any telephone on the national network, and in cases where two operators are required to complete the call to the control room we arrange for the equipment to call a local number which would then pass the information on to the control room. This difficulty is not very often met and in any case, with the rapid increase of the number of automatic exchanges it will pass altogether during the foreseeable future. It is worth mentioning that the calling facilities of the Mark I equipment can be modified to call two different numbers alternately.

The Mark II system provides the control room attendant with the supervisory information set up on telemeter dials and indicator lamps. The interrogation or alarm call are carried out in an identical manner with that of the Mark I system, but after the initial preamble of the verbal message the control engineer can depress a supervisory request button which causes the equipment on the holder station site to transmit a voice frequency tone signal. This signal is interpreted by the decoding equipment in the control room and displayed on the console dials and lamps.

The standard Mark II system will provide up to seven telemetered channels and 12 lamp indications, but these numbers can be exceeded at small extra cost.

An accuracy of up to $\pm 1\frac{1}{2}\%$ is available on each telemeter channel, but in accordance with our principle of economy we would not advise the full accuracy to be used unless really necessary as it increases the cost of the primary sensing instruments.

The average time for the complete display to be set up on the console is less than 20 seconds, and in some cases this may be considered an advantage over the more leisurely rate of the supervisory message of the Datofonic Mark I system. An obvious drawback, however, is that the information can only be received by the control room attendant as it is necessary to have the display and decoding equipment available. This rules out the interrogation from a call office box which the mobile engineer is able to make when the holder station is equipped with a Mark I system.

The display console in the control room can be used with an indefinite number of holder stations. This is achieved by providing detachable engraved plaques for dropping on to the face of the display panel, each plaque being marked according to the associated holder station which it represents.

Remote control facilities are available on the Mark II system and are transmitted by means of a telephone type dial. For instance, the dial code of 022 would close down the volumetric governor. Dial code 033 would open it by an $\frac{1}{4}$th and progressive dial codes would increase the setting of the governor in $\frac{1}{4}$th steps up to maximum.

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for the volumetric governor and operate boosters and similar plant.

Advantages of the Mark III system are that it does not require an elaborate console display unit, and the verbal information is available to any telephone on the public system. This latter feature is always popular with mobile engineers and apprehensive distribution engineers who like to call various holder stations from their own homes at Sunday lunchtime in order to put their minds at rest that stocks and pressures are being maintained at a serviceable level.

The instrumentation associated with Datofonic equipment has been designed on the simplest basis possible and, as a rule, all primary sensing instruments are mercury manometers. Mechanical instruments are avoided as far as possible. A low pressure manometer operating between 0 and 12 in. w.g. has been developed which is accurate to .1 in. w.g. The manometer used in conjunction with the hydrostatic column is calibrated empirically from selected positions of the holder during installation of the equipment.

Post Office telephone type equipment has been used as standard wherever possible. The various control relay chassis are of the jack-in type and are instantly removable in the event of maintenance being required.

Each unit of apparatus is standardised and all are fully interchangeable between installations. The holder station equipment is contained in a steel cabinet which is fitted with a P.V.C. gasket. When the lid is bolted on to the cabinet an airtight seal is obtained and the relay equipment within is completely insulated from atmosphere and dust.

The circuits associated with the record player are fully transistorised and completely trouble free. The life of the record is longer than 1,500 playings before any noticeable deterioration of quality takes place. Early experiments, however, on using tapes as a recorded medium indicated that they gave less trouble-free operation than simple disc-recordings.

Needless to say some of the early installations had their teething troubles, but the majority were not related to equipment, but to operational snags which could only be discovered in practical field experience. The fault rate is now far less than one per year per installation.

When a report is received by the manufacturers of suspected maloperation of a Datofonic system, they have the most unusual advantage of being able to interrogate the system over the national telephone system from their headquarters at Brighton, subsequently advising the user of their findings. If the fault is a simple one the user can be instructed on the course of action to take, but in the event of a more serious fault the firm's maintenance engineers are available for providing service.

BOOK REVIEW

INFLUENCE OF THE SULPHUR CONTENT OF GAS ON THE DEW POINT OF THE PRODUCTS OF COMBUSTION WITH REGARD TO THE CORROSIVE EFFECTS OF FLUE GASES

By Dipl.-Ing. F. Tiemann,
Gaswärme Institut e.V., Essen-Steele

THIS is one of nearly 1,000 reports on research in all branches of applied science, which is being sponsored by the Ministry of Education of the State of North Rhineland-Westphalia. The purpose of the present report is to determine how the dew point of products of combustion of grid gas, at a constant excess air ratio of approximately 1:2, is affected by different sulphur contents, and how it varies when the excess air ratio changes from approximately 1:0 to 1:8 at constant sulphur content in the gas.

The corrosive action of any condensate of an air/sulphuric acid/steam mixture depends, not only on the dew point below which condensation begins, but also on the quantity of the condensate. It was, therefore, considered advantageous to use the electrical conductivity method for the determination of the dew point, because the measurement of the conductivity of the film of condensate furnishes at the same time a quantitative statement on the amount of condensate.

The first series of tests concerned dew point determinations with artificially produced mixtures of air-sulphuric acid/steam. The dew point was determined in every case by taking readings of the milli-ammeter every minute for 5 to 10 minutes, with the temperature kept constant by blowing cooling air around the platinum electrodes. This was repeated for five different temperatures.

The slope of the graphs, i.e., the rate of rise of the current in unit time was transferred to another graph with the temperature as the abscissae, and the intersection of the transferred graph with the abscissae indicated the dew point. This series of tests showed that the rise in dew point and the quantity of condensate increased as a linear function of the SO_3 concentration.

In the second series of tests, CS_2 was added to grid gas in increasing percentages until the sulphur content rose to 22 grains per cu.ft. at an excess air ratio of 1:2. Contents of less than .5 grains S per cu.ft. can be considered as harmless, but there was a rapid rise in dew point, and therefore, in corrosive attack, as the sulphur content rose to 9 grains per cu.ft., followed by a more gentle rise beyond this figure.

When the sulphur content was kept constant at 7.9 grains per cu.ft. the highest dew point was recorded for an excess air ratio of 1:2 while the dilution resulting from still higher air ratios led to some slight drop in dew point readings.

A simple formula enabled the author to calculate the SO_3 percentage in the total amount of sulphur oxides during the second series of tests. The maximum SO_3 percentage was found to be 1.2% with a rising tendency as the excess air ratio rises at constant sulphur content, and as the sulphur content rises at constant excess air ratio.

No. 906 OF THE RESEARCH REPORTS OF THE STATE OF NORTH RHINELAND-WESTPHALIA. WESTDEUTSCHER VERLAG, COLOGNE AND OPLADEN.

PRICE DM 11·80 (APPROX. £1 1s. 0d.).

Biological treatment is the cheapest and easiest answer to the pressing problem of the disposal of poisonous waste liquor at carbonising plants. Strains of bacteria are used to break down the phenolic bodies present in the liquor by micro-biological oxidation into water and harmless material. Six such plants are already in operation and another is under construction. Initial inoculation of selected cultures of freeze-dried bacteria has enabled Simon-Carves to reduce commissioning time from several months to two or three weeks.

Recognising the immense importance of effluent treatment to industry in general, Simon-Carves and Monsanto Chemicals have set up a joint advisory service so that the combined experience of the two companies is available to help you with your effluent problems.

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NEWS SUPPLEMENT

MR. GEORGE VISITS EASTERN BOARD

MR. J. C. GEORGE, C.B.E., M.P., Parliamentary Secretary to the Ministry of Power, recently visited the combined Tottenham and Watford Division of Eastern Gas Board. He paid special attention to the central billing department at Woodall House, Divisional Head Office, which sends out 40,000 gas bills every week.

Mr. George was welcomed by the Chairman, Mr. John H. Dyde, and the Deputy Chairman, Mr. F. T. Brookes, and met principal officers of the Board as well as divisional heads.

In central billing he was shown the electronic machines by the Chief Accountant, Mr. H. R. Hazeldine.

The central billing office with electronic accounting machines was inaugurated by the Board in 1959, and the inclusion of all the towns and districts into the system has been a gradual one.

Formerly the work was carried out by more than 80 separate offices throughout the area.

The visit also included the inspection of the modernised clerical department. The Parliamentary Secretary then toured Willoughby Lane works.

SAHARA GAS SCHEME TERMS FORWARDED TO MINISTER

AGREEMENT has been reached by the Gas Council, Conch and the French authorities responsible for the development of the Hassi R'Mel gasfield, in the Sahara, on the terms of the contract under which liquid methane could be supplied from North Africa to Great Britain.

In a statement issued on Monday it was revealed that the Gas Council has forwarded particulars of the scheme to the Ministry of Power for consideration by the Minister.

The scheme provides for the importation of approximately 350 mill. therms (say 700,000 tons) of liquid methane a year from Port Arzew, near Oran, to Canvey Island, Essex, for onward transmission in the first instance to seven area gas Boards—North Western, East Midlands, West Midlands, Eastern, North Thames, South Eastern and Southern.

Two ships, each with a capacity of 11,000 tons of liquid methane, would transport the gas. They would be built at a British shipyard.

Conch International Methane Ltd. is owned 40% by Canadian Shell Ltd., 40% by Continental Oil Company, and 20% by Union Stock and Transit Company, Chicago.

A challenge from coal

THE Government will have to adjudicate between two nationalised industries in a clash over the import of methane gas from North Africa, says the Political Correspondent of *The Sunday Times.*

The National Coal Board is challenging the proposals of the Gas Council for the regular import of methane from the Sahara.

The N.C.B. is trying to persuade the Minister of Power, Mr. R. Wood to withhold his consent, not only because of the political insecurity in North Africa, but because its scientists hope to produce new techniques within six months for producing gas from coal without leaving surplus coke.

The Central and Northern Division of the Scottish Gas Board organised exhibitions in towns throughout the area during Commonwealth Technical Training Week. The exhibitions were held in Thurso, Inverness, Buckie, Keith, Dundee, Cupar, St. Andrews, Kirkcaldy and Dunfermline.

West Midlands mainlayers work by night

WEST Midlands Gas Board distribution staff working by floodlight have completed a 15-hour operation to lay an 18-in. diameter gas main across four main railway lines near Walsall.

'Operation midnight' was part of a scheme to lay a gas main from the holder station at James Bridge, Darlaston Road, Walsall, across land belonging to the Gas Board and British Railways to the engineering works of F. H. Lloyd Ltd.

The main also has to cross the 10-ft. wide River Tame, and two embankments to a height of about 60 ft. before reaching the works.

Mr. J. C. George, C.B.E., Parliamentary Secretary to the Ministry of Power (centre) is shown the tape-to-card electronic converter machine in the central billing department of the combined Tottenham and Watford Division, Eastern Gas Board, when he visited Woodall House Head Office of the Division. With him, left to right, are: Mr. S. B. Wright, Accounting and Mechanisation Officer; Mr. H. R. Hazeldine, Chief Accountant; Mr. J. H. Dyde, Chairman; and Mr. F. T. Brookes, Deputy Chairman.

AIR POLLUTION STATISTICS QUERIED

IT has been alleged that Bingley (Yorkshire) Council's smoke-control policy was based on wrong figures. This statement was made by Coun. L. Hanson, who said that a letter from the West Riding County Council had stated that the present arrangements for measuring smoke pollution were to end.

It had apparently been decided, he said, that the instruments they had used for measuring pollution had not served their purpose. This, he asserted, bore out his own view that the figures the Council were given on which to base their smoke-control plans bore no relation to the facts.

At a public inquiry into the Council's proposals to make two other parts of Bingley into smokeless zones, it had been more or less admitted that the figures produced locally were not completely accurate.

The Council resisted the attempt to postpone for a year the decision on making the Bradford Road area a smokeless zone.

Gas-fired equipment in technical college extension

THE six-storey, £500,000 extension to The College at Swindon, Wiltshire, housing technical training facilities to meet the needs of modern industry, has a large selection of gas-fired equipment.

Over 4,500 full-time, part-time and evening students drawn from a wide area attend The College, which has workshops in two tiers at the rear.

A 6-in. main of the South Western Gas Board feeds the workshops block, which includes auto engineering, building, welding plumbing and gas-fitting, painting and decorating, heat treatment, sheet metal, steam engine laboratory, woodworking and fluids laboratory.

Gas-fired equipment in this block includes three pipe-bending hearths, lead and solder melting pots, a profile cutting machine, gas engine, steam boilers, muffle furnace, incandescent double-chamber high speed tool furnace, incandescent oven furnace, salt bath, cyanide pot, points for Bunsen burners and other apparatus, and gas-air torches.

The main block, which is supplied by a 6-in. gas main, consists of science, chemistry and physics laboratories, mathematics and commercial departments and domestic science, art and photographic departments.

Total maximum consumption of The College is about 11,000 cu.ft. an hour.

In March 351 gas lamps and 132 electric street lamps were damaged in Leeds, mainly through smashed lanterns.

GAS EXHIBITS AT BLACKPOOL HEALTH SHOW

A general view of one of the Gas Council's Stands at the Royal Society of Health Exhibition held at Blackpool recently. The exhibits included a feature on a 'Clean Air' theme and a display of equipment, including central heating boilers, incinerators and catering equipment.

GAS COUNCIL SECRETARY

MR. R. G. Huxtable, M.B.E., is to be the new Secretary of the Gas Council. On August 1 he succeeds Mr. Wilfrid Bailey, who becomes Deputy Chairman of the Southern Gas Board. Mr. Huxtable has been secretary of the South Eastern Gas Board since 1956 and was previously the Board's solicitor.

Roy George Huxtable (49), was educated at Ilfracombe Grammar School and Wadham College, Oxford. He was born at Woolacombe, N. Devon. He entered the legal profession and was admitted as a solicitor in 1935. He practised privately, specialising in work for large commercial corporations until 1940, when he joined the R.A.F. He rose from the ranks to become a Squadron Leader.

He saw service mainly in S.E. Asia and India Commands and was awarded the M.B.E. for work in enemy occupied territory.

Mr. Huxtable resumed legal practice in 1946 and in 1949 established the S.E. Gas Board legal department, becoming secretary seven years later.

COMING EVENTS

June 16.—I.G.E., MANCHESTER AND DISTRICT SECTION: Whitby. Chairman's Day. 11.30 a.m.

June 21.—I.G.E., SOUTH WESTERN SECTION: Torquay. Summer Meeting and Ladies' Day.

June 23.—I.G.E., MIDLAND SECTION: Summer Meeting. Visit to Walsall and Dudley. 10 a.m.

PERSONAL NOTES

MR. W. HYDE, chief accountant of the Southern Gas Board since 1956, will be leaving on August 1 to take up the appointment of Director of Finance and Administration of the West Midlands Gas Board. Mr. Hyde's successor as Chief Accountant of the Southern Gas Board will be MR. J. H. SMITH, at present assistant chief accountant of the West Midlands Gas Board. Mr. Hyde, 40 years of age, has spent all his business career in the gas industry. He was first employed by the Liverpool Gas Company, subsequently included in the North Western Gas Board, his last appointment with them being group accountant. His war service from 1940 to 1946 in the R.E.M.E. saw him engaged on Radar and Wireless Repair and Research and his duties took him on demonstrations and lecture tours to U.S.A. and India. Since coming to the Southern Gas Board in 1956 Mr. Hyde has been responsible for centralisation of all accountancy procedures, and will be remembered in particular for the open-plan layout at the Board's Winchester Road offices which is one of the biggest of its type in the country. He is also associated with work on sample costing. He was Chairman of the Bournemouth Branch of the Institute of Office Management until recently. Mr. Smith is 43 years of age, and before joining the gas industry in 1949 spent a period in local government and electricity service in Lancashire. His war service in the Army took him to North Africa and Italy. Joining the Walsall Division of West Midlands Gas Board in 1949 he became chief internal auditor to the Board in 1955 and shortly afterwards, assistant chief accountant.

MR. S. EVERINGTON, of Northallerton, Yorkshire, has been appointed a member of the Northern Gas Consultative Council.

B.G.S.A. meets at Folkestone for its annual conference

THE 1961 Annual Conference of the British Gas Staff Association was held recently at Folkestone. The Mayor, Alderman F. W. Archer, who is also Chairman of the B.G.S.A. Branch, welcomed his own association as well as the Chairman and other officers of the South Eastern Gas Board.

Mr. W. E. Webb, President of the Association, spoke of the negotiations of the past year, referring to the salary claim which had been settled for staff and senior officers, 'thus maintaining the gas industry's position among the good employers in this country.'

He told the Conference that over 2,000 new members had been enrolled into the Association in 1960, a considerable proportion of whom had been women.

Mr. Webb said he considered industrial unionism, in which all members serve one industry, as the best form of trade unionism, which he believed would eventually be accepted. He called for the more effective use of the joint consultative machinery which had been established.

'Unfortunately and too often, consultation now takes place only after decisions have been taken, whereas many difficulties could be avoided and good feeling preserved if consultation took place before managerial decisions are announced. This would involve considerable responsibility on the part of the trade unions, but the B.G.S.A. would be fully prepared to accept this in the general interest,' said Mr. Webb.

From left to right: Alderman F. W. Archer, Mayor of Folkestone; Mr. R. N. Bruce, standing, Chairman, South Eastern Gas Board; Mr. W. E. Webb, President, B.G.S.A.; Mr. F. C. Henfrey - Smith, General Secretary; Mr. H. J. Arnold, National Organiser.

Mr. R. N. B. D. Bruce, O.B.E., T.D., Chairman of the South Eastern Board, on the subject of production, said: 'Traditionally the industry has been founded on the carbonisation of coal, and by far the greater quantity of gas produced at the present time is made in this way.

'Cost of materials depends on the difference between the cost of coal and what one gets for by-products, and if we consider that a ton of coal contains 300 therms only about 25% of these therms appear as gas for sale, while approximately 50% appear as coke for sale and the balance of just over 25% consist of by-products such as tar and the materials used in the process of carbonisation.

'The cost of gas produced by carbonisation is therefore greatly affected by the price which can be obtained for coke.

'In my opinion it is necessary to obtain a net price for coke of at least 1.2 times the cost of the coal in order to achieve a net materials cost low enough to make this method a viable one.

'It is therefore essential to produce a first-class solid smokeless fuel which can command a premium price.

'Thus the future of carbonisation is dependent more on selling coke in the domestic market in the forms of Cleanglow, Phimax, Gloco, Sebrite, etc., rather than in the commercial field, where it is competing very much more directly with fuel oils which can now be obtained at a low price per therm.

'If this is accepted, carbonisation will continue, certainly during our lifetime, with our existing plants making premium fuels either from vertical retorts or from static retorts with pre-treated coal, and thus enable us to meet the demands for such fuels required as a result of the Clean Air Act.

'Carbonisation, however, has two disadvantages. First of all the capital cost of plant put up today might be five times as much as the cheapest catalytic gas reformer.

'The number of men required to produce the same amount of gas is in the same ratio, and maybe as high as 5 to 1 compared with a reformer, which again has a considerable effect on operating costs.'

Mr. Bruce said that it must be right to use an indigenous source of fuel, such as coal, if gas could be produced from it at the cheapest possible price.

Gasification plants seemed to be the answer, as the capital cost was lower than that for carbonisation plant, less labour was required and the gas was produced under pressure.

Such plants should be sited on the coalfields.

The best known gasification plant was the Lurgi, which produced a lean gas which must be enriched. It did however produce considerable quantities of effluent, so development work was being carried out on slagging gasifiers which not only made smaller quantities of liquor but could use a wider range of coals.

In simple terms, the industry, said Mr. Bruce, was trying to produce a source of cheap hydrogen and enrich it with a cheap high calorific gas, almost certainly a petroleum product, such as refinery gas or imported light petroleum gases such as propane or butane.

The industry had also been producing gas from oil for a very considerable time, in carburetted water gas plants, the efficiency of which had been greatly increased in recent years.

OIL GASIFICATION

In the last five years, oil gasification plants had been installed in considerable numbers. These were of low capital cost, low manpower requirements, and used products of the oil industry available at the present time at low cost.

Mr. Bruce continued: 'This brings me to a point in gas production which is annually becoming more important, that is the necessity to have one's load factor as high as possible in order to spread one's capital cost over every therm of gas made.

'This is bedevilled to some extent by a change in the pattern of gas sales taking place at the moment. This industry has been through the gas lighting phase, is in what might be called the gas cooking phase, and is now rapidly taking the space heating phase in its stride.

'The diversity factor between summer and winter in an average board is perhaps 1 to 2 and this ratio may well change in the next few years to 1 to 3. It is therefore essential that any plant put in in the future should be flexible enough to deal with this change in load pattern.

'The gasification of oil and coal gives one a better opportunity of meeting this pattern than does carbonisation.

LARGE UNITS

'There is obviously no one alternative, except that any plant to meet the increased requirements of gas which will undoubtedly come, must be in large units, either for the industry as a whole or for the greater part of one board's area.

'I leave it to you to decide, as far as your own areas are concerned, which of these alternatives would be suitable, keeping in mind that most of the suitable coal required either for carbonisation or gasification is found in the North of England or the Midlands, while most of the oil discharging points and refineries are perhaps nearer the big ports, most of which at least are in the South of England.'

Mr. Bruce then explained the possible developments in distribution, dealing particularly with the advantages and possibilities of underground storage. 'If a Board such as the South Eastern could put 10% of its annual production into underground storage during the summer and take it out during the winter, then it would be in a position to close down something like 35% of its less economic plant.

'The second point on distribution is the comparative cost of transmission of electricity by overhead cables (it is more expensive to put them underground) and gas by high pressure pipelines. The latter is considerably cheaper, based on the cost of moving a therm of equivalent energy.'

ENRICHING

Mr. Bruce also mentioned the possibility of enriching gas beyond 500 to possibly 600 c.v., a development well worth watching, and he referred to experiments in the use of plastic pipes for mains and services.

Of sales and service, Mr. Bruce said there was a limitless field for expansion in domestic space heating.

'It is, however, no good having just one gas appliance in the house. I have a firm conviction that our future lies in retaining the cooker load and selling another gas appliance with it.

'If you believe, as I do, in this two-appliance philosophy, one way might be to offer two appliances both at the same time as a package deal, at a cost below the normal total price.'

Mr. Bruce ended by saying that the industry was at the cross-roads and it was vital that it took the right turning.

The General Secretary, Mr. F. C. Henfrey-Smith, introducing the Annual Report, referred to the White Paper, 'The Financial and Economic Obligations of the Nationalised Industries,' in which the Government had set out the financial principles it intended to adopt.

WHITE PAPER

He pointed out that even more stringent financial controls would be put upon the nationalised industries which would be expected to obtain a return on their capital more comparable with that of private commercial enterprise.

The Association would undoubtedly make strong representations to the Minister if it was found that the Government's declared financial policy for the industry demanded still further retrenchment and economy, which in turn might lead to a lessening of service to consumers, a retarding of the industry's development and still further hardship and upheaval to the staff.

On the possible importation of methane, the Association still advocated the continued use of coal if the price was right, but could not oppose the importing of methane if such could reduce the price of gas and so extend its use. Such a development would however, have an effect upon staff employment, particularly of production engineers, and would be closely watched by the Association, said Mr. Henfrey-Smith.

The delegates unanimously supported the need for a national fuel policy and instructed that the Association's policy statement, previously issued, should be given the widest possible publicity.

In connection with his contribution to the discussion of the paper by Dr. T. Nicklin and Dr. E. Brunner on the Stretford process, presented at the recent annual general meeting of the Institution in London, Mr. L. C. Bennett, Chief Chemist of the South Western Gas Board writes:

'The use of vanadates to improve the reaction rate and thus reduce the thiosulphate formation appears to be a most promising development but this has not yet been introduced at Bristol. This improvement may well be of great importance as even a relatively slow rate of thiosulphate formation will ultimately mean not only the replacement of valuable reagent, but also the introduction of the problem of effluent disposal. Increasing interest in trade effluent on a nationwide basis is indicative of the potential value of this process, providing that thiosulphate formation can be kept to a minimum.' Our report on this discussion, did not make these points sufficiently clear.

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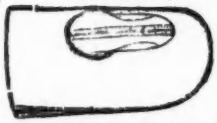
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APPOINTMENTS VACANT

WEST MIDLANDS GAS BOARD
BIRMINGHAM AND DISTRICT DIVISION

VACANCY FOR
DISTRICT INSPECTOR

CANDIDATES must be suitably qualified and fully experienced in the installation and maintenance of all types of gas appliances and ancillary equipment and be capable of controlling a staff of Assistant Inspectors, Gasfitters and District Maintenance Men (Consumer Service).

The person appointed will be responsible to the Divisional Sales and Service Officer for the installation of appliances and maintenance work on consumers' premises in a sector of approximately 30,000 consumers covering both residential and industrial premises.

The salary for the appointment will be within the range of £975-£1,095 per annum.

Applications, stating age and qualifications, with particulars of training and experience, should be addressed to Mr. J. E. Wakeford, Divisional General Manager, West Midlands Gas Board, Edmund Street, Birmingham, 3, **to reach him not later than June 23, 1961.**

WEST MIDLANDS GAS BOARD
NORTH STAFFORDSHIRE DIVISION

VACANCY FOR
ASSISTANT ENGINEER,
LEEK DISTRICT

CANDIDATES should be Associate Members of the Institution of Gas Engineers or possess equal qualifications. They should have had experience in the control and operation of continuous vertical retorts and ancillary plant.

The salary will be within the range of £770-£870 per annum.

Applications, stating age, qualifications and experience, should be addressed to Mr. L. W. Johnson, Divisional General Manager, West Midlands Gas Board, Etruria Gas Works, Etruscan Street, Stoke-on-Trent, Staffs, **to reach him not later than June 23, 1961.**

CITY OF PORTSMOUTH
HIGHBURY TECHNICAL COLLEGE

APPOINTMENT OF ASSISTANT LECTURER IN GASFITTING

APPLICATIONS are invited for the above appointment to date September 1, 1961. Applicants must hold at least a final certificate in Gasfitting of the C.G.L.I.

The salary scale is from £700 to £1,150 per annum, and previous experience may be taken into account in determining the commencing rate.

Further particulars and application forms, which should be returned by June 23, 1961, may be obtained by sending a stamped addressed envelope to the Registrar, Highbury Technical College, Park Road, Portsmouth.

WALES GAS BOARD
CARDIFF UNDERTAKING

SHIFT ENGINEERS

DUE to rapid expansion of the Grangetown Gas-works at Cardiff, four SHIFT ENGINEERS are required.

The Station handles a base load of twelve million cu.ft. per day of crude coke oven gas, and has Gastechnik, Liquid and ordinary box purification plants.

The Station also has twelve million cu.ft. per day peak load plant capacity consisting of C.W.G. and Butane/Propane plant. Gas is boosted and compressed to the Cardiff and Barry districts and to the South Wales Grid.

Candidates should have had experience in the operation of gas production, steam raising plants, gas exhauster, boosters, compressors and gas holder control. Experience in the control of labour is essential.

The salary for the appointments, which are pensionable and subject to a medical examination, will be within the range of A.P.T. 8 (£830-£930) with initial placing according to qualifications and experience.

Applications, stating age, qualifications and experience, together with the names of two referees, must be received, addressed as below, within fourteen days of the appearance of this advertisement.

The General Manager and Engineer.
Cardiff Undertaking.

Wales Gas Board,
Bute Terrace,
Cardiff.

SOUTHERN GAS BOARD

ELECTRICAL FOREMAN—
READING WORKS

APPLICATIONS are invited for the post of Electrical Foreman at the Reading Works of the Southern Gas Board.

The successful applicant will be responsible for the maintenance of all lighting and power installations comprising 220 v. D.C. and 230-440 v. A.C. and 11,000 v. A.C. equipment. He will be required to inspect all new electrical installation work prior to its acceptance by the Southern Gas Board and will be responsible for the maintenance of records adequate for the working of the department.

A Higher National Certificate in Electrical Engineering is desirable, and a wide practical experience in this type of work is essential.

The salary will be within A.P.T. grade 7 (£770-£870 per annum) of the National Salary Scales for Gas Staffs, according to experience and qualifications. The successful candidate will be required to pass a medical examinaiton and to join the Board's Staff Pension Scheme.

Forms of application may be obtained from the Personnel Manager, Southern Gas Board, 164, Above Bar, Southampton, to whom they should be returned by June 19, 1961.

SOUTHERN GAS BOARD

SENIOR INDUSTRIAL AND
COMMERCIAL REPRESENTATIVE
READING REGION

APPLICATIONS are invited for the post of Senior Industrial and Commercial Representative in the Reading Region of the Southern Gas Board. Applicants must have a wide experience of the use of Gas for Industrial and Commercial purposes, and for Central Heating. The starting salary will be within Grades A.P.T. 10/11 (£975-£1,180) of the National Salary Scales for Gas Staffs according to experience and qualifications.

The successful candidate will be required to pass a medical examination and to join the Board's Staff Pension Scheme.

Forms of application may be obtained from the Personnel Manager, Southern Gas Board, 164, Above Bar, Southampton, to whom they should be returned by June 21, 1961. Please quote reference S/R/187.

SCOTTISH GAS BOARD

DOMESTIC APPLIANCE SALES
MANAGER

A **CONTINUATION of the policy of** of expansion has made it necessary to appoint a Domestic Appliance Sales Manager in the Glasgow and Western Division of the Board. He will be responsible to the Divisional Sales Manager for the development of Domestic Appliance Sales through teams of Supervisors and Salesmen.

The type of man we are looking for will probably be an Assistant Sales Manager or Area Manager in a commercial undertaking who feels that he is ready to accept further responsibility and who is confident that he can apply up-to-date marketing techniques to develop Sales. Evidence of experience in the control direction and motivation of Salesmen in the field will weigh heavily in making the final appointment.

The post offers a starting salary in the range of £1,695-£2,080 per annum depending upon qualifications and experience. A Contributory Pension Scheme is in operation. A car is provided for business use or alternatively a generous mileage allowance is given where the applicant owns his own car.

The requirements for the job are: Age 30-40, good educational background (a Degree would be an advantage); knowledge of selling customer durables; good organising and administrative ability.

Please reply in confidence, within ten days of the appearance of this advertisement, giving brief details of age, education and past experience, together with the names of two referees, to:

A. T. HERD,
Secretary.

26, Drumsheugh Gardens,
Edinburgh, 3.

NEW ZEALAND
DEPARTMENT OF SCIENTIFIC AND
INDUSTRIAL RESEARCH

VACANCY No. 1617—GAS EXAMINER, DOMINION LABORATORY, LOWER HUTT, WELLINGTON

APPLICATIONS are invited from graduates or persons with other suitable qualifications for the position of Gas Examiner under the New Zealand Industry Gas Regulations.

Duties involve regular visits to gasworks and considerable travelling.

Salary according to qualifications and experience.

Passages: Steamer fares of up to £172 each for the appointee and his wife, and pro rata for dependent children will be paid.

Incidental Expenses: Up to £35 for a single person and £100 for a married man can be claimed to cover the cost of taking personal effects to New Zealand.

Application forms and further details are available from the High Commissioner for New Zealand, 415, Strand, London, W.C.2, with whom applications will close on August 4, 1961.

Please quote reference B.13/18/7 when enquiring.

ENGINEERS

PADDINGTON TECHNICAL COLLEGE,
SALTRAM CRESCENT, W.9

ASSISTANT TEACHER GRADE B required to teach theory and practice to apprentices of the HEATING and VENTILATING industry.

Preference will be given to candidates who can also offer one of the following subjects Gas Fitting, Welding or Machine Shop practice.

Candidates should have suitable qualifications to teach subjects of C. & G. standard, and good industrial experience.

Salary within range £738-£1,201, but with additions for qualifications and training up to a maximum of £1,486. Point of entry dependent on relevant experience.

Application forms from Secretary returnable within 14 days, quoting (FE.3a/G/1413/6).

NORTH EASTERN GAS BOARD
BRADFORD DISTRICT

DISTRICT INSPECTOR

APPLICATIONS are invited for the above post at a salary within Grade A.P.T. 5 (£660-£760 per annum) of the Salary Scales agreed by the National Joint Council for Gas Staffs.

Candidates should be apprentice-trained Gas Fitters and should have had district experience as First Class Gas Fitters. They should be capable of supervising the carrying out and completion of all types of fittings installations, maintenance and repairs, and should be able to deal with the organisation of work, with fittings generally and with the control of Gas Fitters.

Candidates should be able to drive or be prepared to take a course of instruction.

The successful applicant will be required to pass a medical examination and to join the Board's Staff Pension Scheme.

A flat is available at a reasonable rental.

Applications, stating age and giving full particulars of education, experience and qualifications, should be forwarded to J. Baxendale, Esq., Group General Manager, North Eastern Gas Board, Bradford Group, Mill Street, Bradford, 1, by Wednesday, June 14, 1961.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.

May 30, 1961.

NORTH WESTERN GAS BOARD

DRAUGHTSMAN—MERSEY GROUP

APPLICATIONS are invited for the pensionable position of Draughtsman at the Industrial Gas Development Centre, Granville Street, Liverpool, 1. The salary will be within Grades A.P.T. 7/8 (£770-£930 per annum).

Applicants should be of good general education and preferably hold a Higher National Certificate or equivalent engineering or architectural qualification. The work consists mainly of preparing drawings of town gas-fired burners and prototype equipment for industrial heating processes, layouts of heating schemes, etc. The position provides scope for initiative in design and a wide variety of work.

Detailed applications, including particulars of present appointment and giving the names of two referees, should reach the Chief Personnel Officer, Mersey Group, North Western Gas Board, Radiant House, Bold Street, Liverpool, 1, within 14 days, quoting Ref. 38/349.